**50SD**
**Legacy™ Single-Packaged Air Conditioner System**
**With R-22 Refrigerant**
**Single- and Three-Phase Units Sizes 024-060**

Carrier®
Turn to the Experts℠

# Installation Instructions

**NOTE**: Read the entire instruction manual before starting the installation.

**NOTE**: Installer: Make sure the Owner's Manual and Service Instructions are left with the unit after installation.

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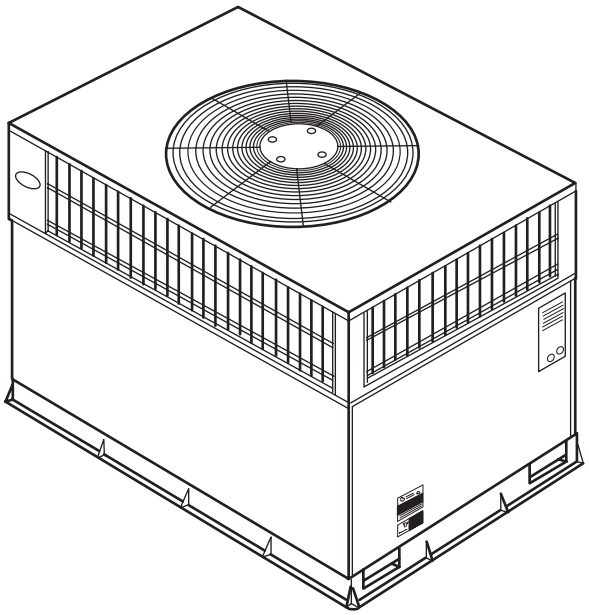

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**Fig. 1 - Unit 50SD**

## SAFETY CONSIDERATIONS

Installation and servicing of this equipment can be hazardous due to mechanical and electrical components. Only trained and qualified personnel should install, repair, or service this equipment.

Untrained personnel can perform basic maintenance functions such as cleaning and replacing air filters. All other operations must be performed by trained service personnel. When working on this equipment, observe precautions in the literature, on tags, and on labels attached to or shipped with the unit and other safety precautions that may apply.

Follow all safety codes. Installation must be in compliance with local and national building codes. Wear safety glasses, protective clothing, and work gloves. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit.

Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words: DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

## ⚠ WARNING

**ELECTRICAL SHOCK HAZARD**

Failure to follow this warning could result in personal injury or death.

Before installing or servicing system, always turn off main power to system. There may be more than one disconnect switch. Turn off accessory heater power switch if applicable.

### INTRODUCTION

The 50SD packaged air conditioner is fully self-contained and designed for outdoor installation (See Fig. 1). See Fig. 2 and 3 for unit dimensions. All unit sizes have discharge openings for both horizontal and downflow configurations, and are factory shipped with all downflow duct openings covered. The unit may be installed either on a rooftop, gound-level cement slab, or directly on the gound if local codes permit. (See Fig. 4 for roof curb dimensions.)

### RECEIVING AND INSTALLATION

**Step 1—Check Equipment**

IDENTIFY UNIT

The unit model number and serial number are printed on the unit informative plate. Check this information against shipping papers.

INSPECT SHIPMENT

Inspect for shipping damage while unit is still on shipping pallet. If unit appears to be damaged or is torn loose from its anchorage, have it examined by transportation inspectors before removal. Forward claim papers directly to transportation company. Manufacturer is not responsible for any damage incurred in transit. Check all items against shipping list. Immediately notify the nearest Carrier Air Conditioning office if any item is missing. To prevent loss or damage, leave all parts in original packages until installation.

**Step 2—Provide Unit Support**

For hurricane tie downs, contact distributor for details and PE (Professional Engineering) Certificate if required.

ROOF CURB

Install accessory roof curb in accordance with instructions shipped with curb (See Fig. 4). Install insulation, cant strips, roofing, and flashing. Ductwork must be attached to curb.

**IMPORTANT**: The gasketing of the unit to the roof curb is critical for a water tight seal. Install gasketing material supplied with the roof curb. Improperly applied gasketing also can result in air leaks and poor unit performance.

Curb should be level to within 1/4 in. (See Fig. 6). This is necessary for unit drain to function properly. Refer to accessory roof curb installation instructions for additional information as required.

SLAB MOUNT

Place the unit on a solid, level concrete pad that is a minimum of 4 in. thick with 2 in. above grade. The slab should extend approximately 2 in. beyond the casing on all 4 sides of the unit (See Fig. 7). Do not secure the unit to the slab *except* when required by local codes.

GROUND MOUNT

The unit may be installed either on a slab or placed directly on the ground if local codes permit. Place the unit on level ground prepared with gravel for condensate discharge.

**Step 3—Provide Clearances**

The required minimum service clearances are shown in Fig. 2 and 3. Adequate ventilation and outdoor air must be provided. The outdoor fan draws air through the outdoor coil and discharges it through the top fan grille. Be sure that the fan discharge does not recirculate to the outdoor coil. Do not locate the unit in either a corner or under an overhead obstruction. The minimum clearance under a partial overhang (such as a normal house overhang) is 48 in. above the unit top. The maximum horizontal extension of a partial overhang must not exceed 48 in.

**IMPORTANT**: Do not restrict outdoor airflow. An air restriction at either the outdoor-air inlet or the fan discharge may be detrimental to compressor life.

Do not place the unit where water, ice, or snow from an overhang or roof will damage or flood the unit. Do not install the unit on carpeting or other combustible materials. Slab-mounted units should be at least 4 in. above the highest expected water and runoff levels. Do not use unit if it has been under water.

**Step 4—Field-Fabricate Ductwork**

Secure all ducts to roof curb and building structure on vertical discharge units. Do not connect ductwork to unit. For horizontal applications, unit is provided with flanges on the horizontal openings. All ductwork should be secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier. If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes. A minimum clearance is not required around ductwork. Cabinet return-air static shall not exceed -.25 in. wc.

**Step 5—Rig and Place Unit**

Rigging and handling of this equipment can be hazardous for many reasons due to the installation location (roofs, elevated structures, etc.).

Only trained, qualified crane operators and ground support staff should handle and install this equipment.

When working with this equipment, observe precautions in the literature, on tags, stickers, and labels attached to the equipment, and any other safety precautions that might apply.

Training for operators of the lifting equipment should include, but not be limited to, the following:

1. Application of the lifter to the load, and adjustment of the lifts to adapt to various sizes or kinds of loads.
2. Instruction in any special operation or precaution.
3. Condition of the load as it relates to operation of the lifting kit, such as balance, temperature, etc.

Follow all applicable safety codes. Wear safety shoes and work gloves.

INSPECTION

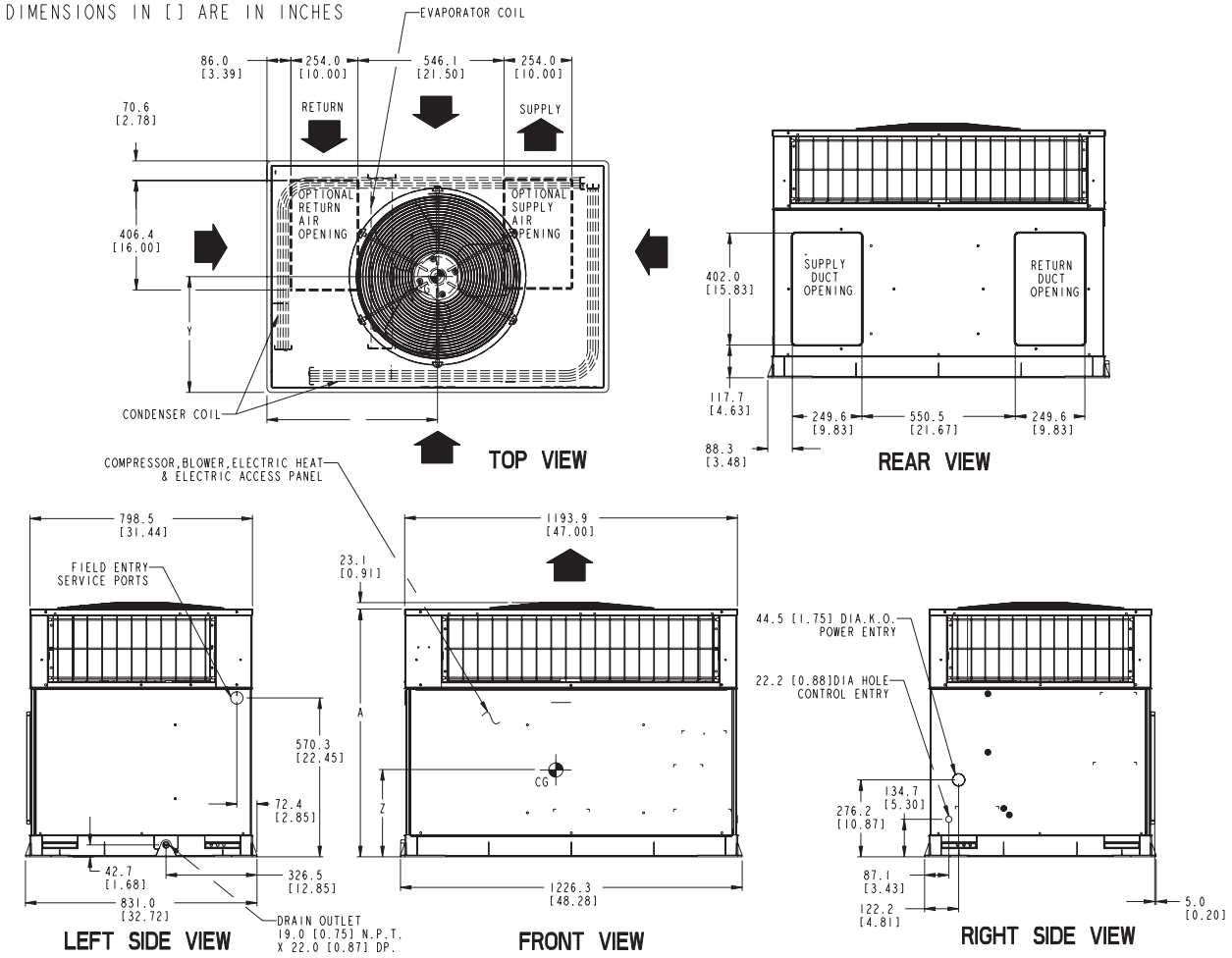
Prior to initial use, and at monthly intervals, all rigging brackets and straps should be visually inspected for any damage, evidence of wear, structural deformation, or cracks. Particular attention should be paid to excessive wear at hoist hooking points and load support areas. Brackets or straps showing any kind of wear in these areas must not be used and should be discarded.

## ⚠ WARNING

**ELECTRICAL SHOCK HAZARD**

Failure to follow this warning could result in personal injury or death.

Before installing or servicing system, always turn off main power to system. There may be more than one disconnect switch. Turn off accessory heater power switch if applicable. Tag disconnect switch with a suitable warning label.




**REQUIRED CLEARANCE TO COMBUSTIBLE MATL.**
**(Refer to Maximum Operating Clearances)**

| | INCHES [mm] |
|---|---|
| TOP OF UNIT | 14.00 [355.6] |
| DUCT SIDE OF UNIT | 2.00 [50.8] |
| SIDE OPPOSITE DUCTS | 14.00 [355.6] |
| BOTTOM OF UNIT | 0.50 [12.7] |

**NEC. REQUIRED CLEARANCES.**

| | INCHES [mm] |
|---|---|
| BETWEEN UNITS, POWER ENTRY SIDE | 42.00 [1066.8] |
| UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE | 36.00 [914.0] |
| UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE | 42.00 [1066.8] |

**REQUIRED CLEARANCE FOR OPERATION AND SERVICING**

| | INCHES [mm] |
|---|---|
| EVAP. COIL ACCESS SIDE | 36.00 [914.0] |
| POWER ENTRY SIDE | 42.00 [1066.8] |
| (EXCEPT FOR NEC REQUIREMENTS) | |
| UNIT TOP | 48.00 [1219.2] |
| SIDE OPPOSITE DUCTS | 36.00 [914.0] |
| DUCT PANEL | 12.00 [304.8] * |

*MINIMUM DISTANCES: IF UNIT IS PLACED LESS THAN 304.8 [12.00] FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAYBE COMPROMISE.

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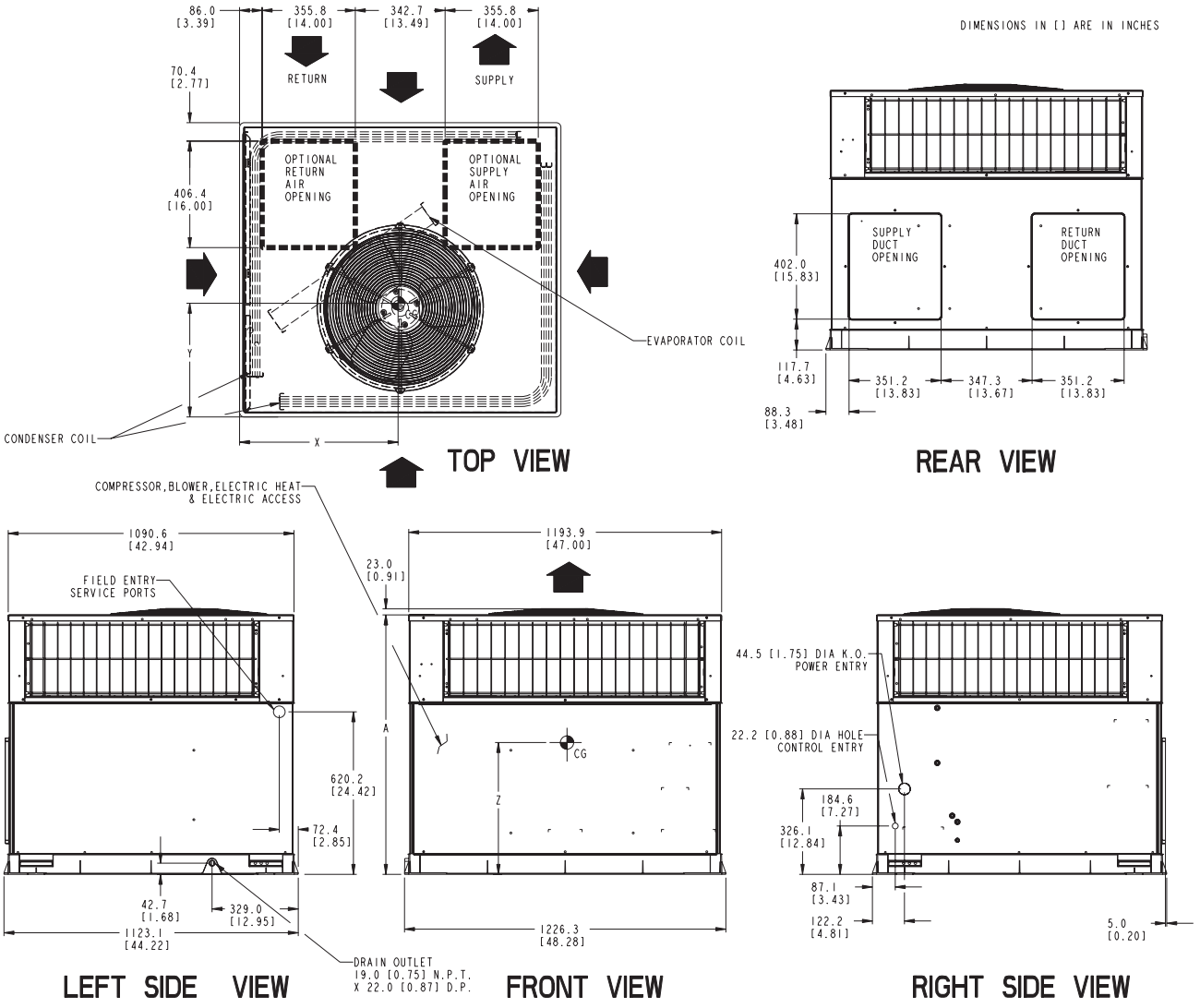
| UNIT | ELECTRICAL CHARACTERISTICS | UNIT WEIGHT | | UNIT HEIGHT IN. [MM] "A" | CENTER OF GRAVITY IN. [MM] | | |
|---|---|---|---|---|---|---|---|
| | | lb | kg | | X | Y | Z |
| **50SD024** | 208/230-1-60 | 343 | 156 | 39.02 [991] | 20.0 [508] | 19.3 [490] | 17.6 [447] |
| **50SD030** | 208/230-1-60, 208/230-3-60 | 366 | 166 | 41.02 [1042] | 20.0 [508] | 14.0 [356] | 13.0 [330] |

**Fig. 2 - 50SD024-030 Unit Dimensions**




**REQUIRED CLEARANCE TO COMBUSTIBLE MATL.**
**(Refer to Maximum Operating Clearances)**

| | INCHES [mm] |
|---|---|
| TOP OF UNIT | 14.00 [355.6] |
| DUCT SIDE OF UNIT | 2.00 [50.8] |
| SIDE OPPOSITE DUCTS | 14.00 [355.6] |
| BOTTOM OF UNIT | 0.50 [12.7] |

**NEC. REQUIRED CLEARANCES.**

| | INCHES [mm] |
|---|---|
| BETWEEN UNITS, POWER ENTRY SIDE | 42.00 [1066.8] |
| UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE | 36.00 [914.0] |
| UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE | 42.00 [1066.8] |

**REQUIRED CLEARANCE FOR OPERATION AND SERVICING**

| | INCHES [mm] |
|---|---|
| EVAP. COIL ACCESS SIDE | 36.00 [914.0] |
| POWER ENTRY SIDE | 42.00 [1066.8] |
| (EXCEPT FOR NEC REQUIREMENTS) | |
| UNIT TOP | 48.00 [1219.2] |
| SIDE OPPOSITE DUCTS | 36.00 [914.0] |
| DUCT PANEL | 12.00 [304.8] * |

*MINIMUM DISTANCES: IF UNIT IS PLACED LESS THAN 304.8 [12.00] FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAYBE COMPROMISE.

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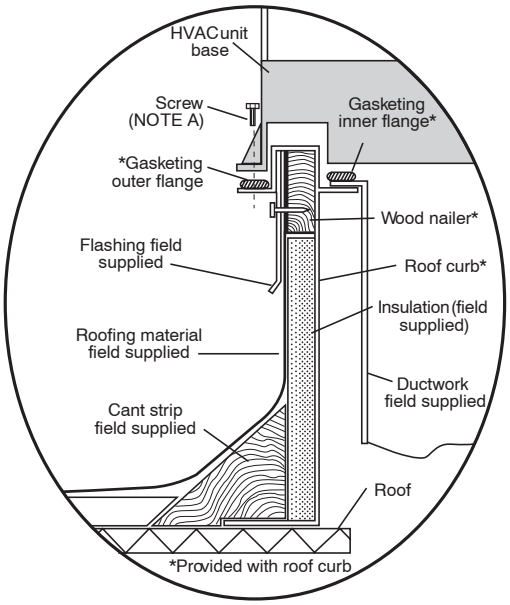
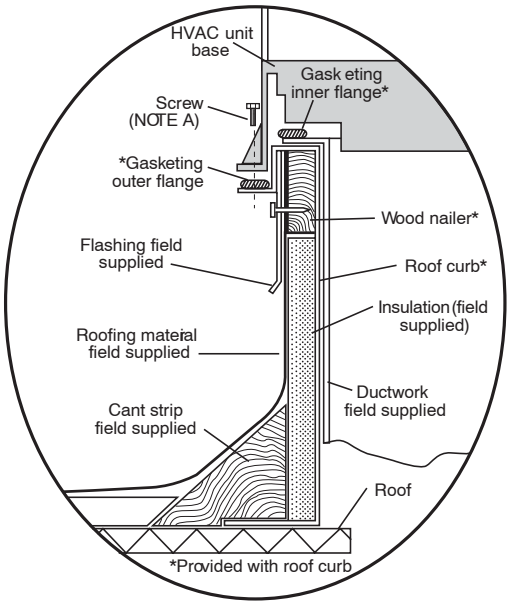
| UNIT | ELECTRICAL CHARACTERISTICS | UNIT WEIGHT | | UNIT HEIGHT IN. [MM] "A" | CENTER OF GRAVITY IN. [MM] | | |
|---|---|---|---|---|---|---|---|
| | | lb | kg | | X | Y | Z |
| **50SD036** | 208/230-1-60, 208/230-3-60, 460-3-60 | 433 | 196 | 42.98 [1092] | 21.0 [533] | 20.5 [520] | 16.6 [422] |
| **50SD042** | 208/230-1-60, 208/230-3-60, 460-3-60 | 460 | 209 | 46.98 [1193] | 21.0 [533] | 20.5 [520] | 17.1 [434] |
| **50SD048** | 208/230-1-60, 208/230-3-60, 460-3-60 | 480 | 218 | 46.98 [1193] | 21.0 [533] | 20.0 [508] | 17.4 [442] |
| **50SD060** | 208/230-1-60, 208/230-3-60, 460-3-60 | 492 | 223 | 46.98 [1193] | 21.0 [533] | 20.0 [508] | 17.6 [447] |

**Fig. 3 - 50SD036-060 Unit Dimensions**




**Roof Curb for Small Cabinet**

Note A: When unit mounting screw is used, retainer bracket must also be used.




**Roof Curb for Large Cabinet**

Note A: When unit mounting screw is used, retainer bracket must also be used.

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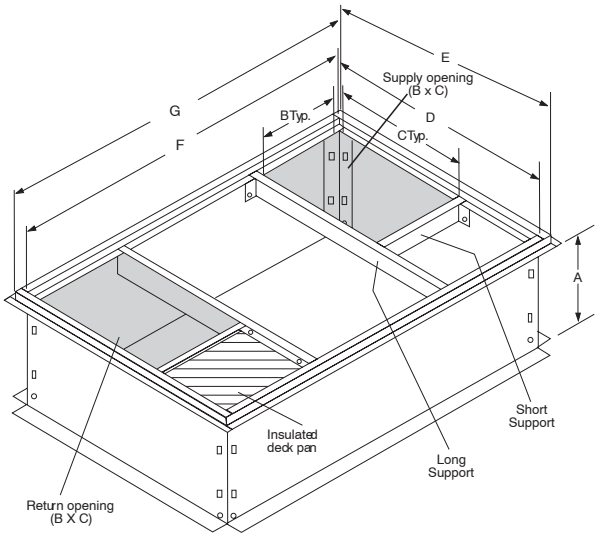


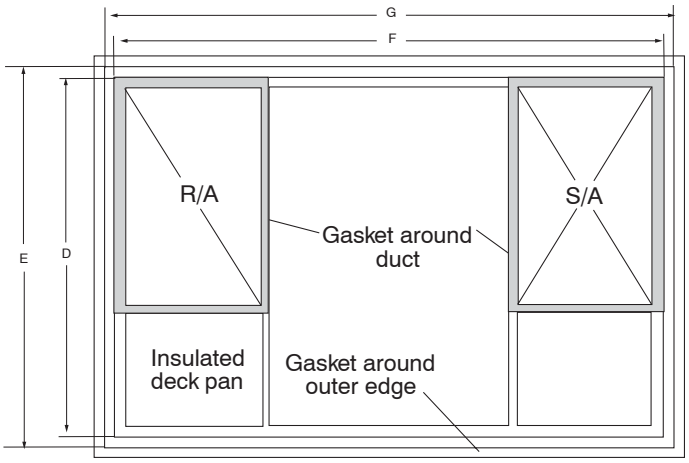


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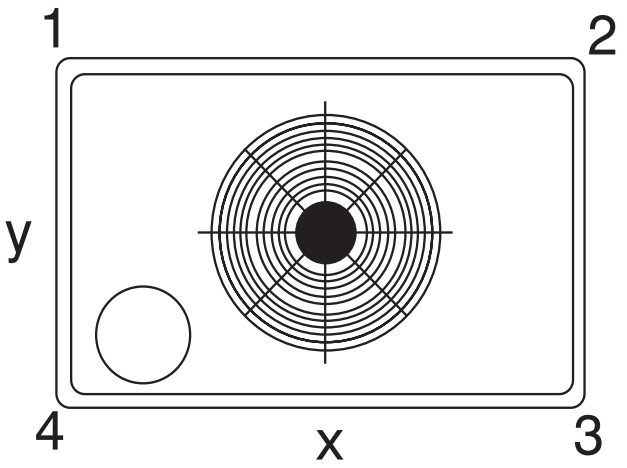
| UNIT SIZE | ODS CATALOG NUMBER | A IN. (MM) | B IN. (MM) | C IN. (MM) | D IN. (MM) | E IN. (MM) | F IN. (MM) | G IN. (MM) |
|---|---|---|---|---|---|---|---|---|
| 50SD024-030 | CPRFCURB006A00 | 8 (203) | 11 (279) | 16-1/2 (419) | 28-3/4 (730) | 30-3/8 (771) | 44-5/16 (1126) | 45-15/16 (1167) |
| | CPRFCURB007A00 | 14 (356) | 11 (279) | 16-1/2 (419) | 28-3/4 (730) | 30-3/8 (771) | 44-5/16 (1126) | 45-15/16 (1167) |
| 50SD036-060 | CPRFCURB008A00 | 8 (203) | 16-3/16 (411) | 17-3/8 (441) | 40-1/4 (1022) | 41-15/16 (1065) | 44-7/16 (1129) | 46-1/16 (1169) |
| | CPRFCURB009A00 | 14 (356) | 16-3/16 (411) | 17-3/8 (441) | 40-1/4 (1022) | 41-15/16 (1065) | 44-7/16 (1129) | 46-1/16 (1169) |

NOTES:

1. Roof curb must be set up for unit being installed.
2. Seal strip must be applied, as required, to unit being installed.
3. Dimensions are in inches.
4. Dimension in ( ) are in millimeters.
5. Roof curb is made of 16-gauge steel.
6. Attach ductwork to curb (flanges of duct rest on curb).
7. Insulated panels: 1-in. thick fiberglass 1 lb. density.
8. When unit mounting screw is used (see Note A), a retainer bracket must be used as well. This bracket must also be used when required by code for hurricane or seismic conditions. This bracket is available through Micrometl.

**Fig. 4 - Roof Curb Dimensions**

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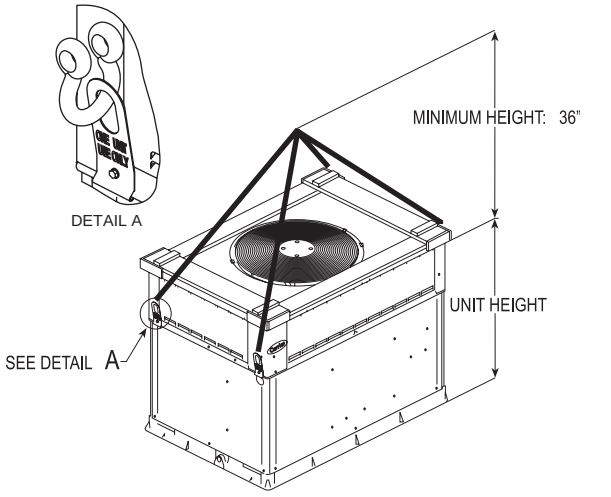


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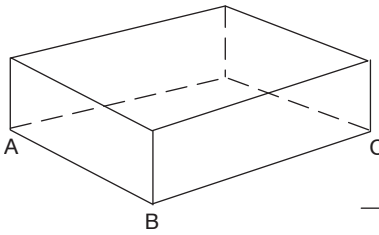
| CORNER WEIGHTS (SMALL CABINET) | | | | CORNER WEIGHTS (LARGE CABINET) | | | | |
|---|---|---|---|---|---|---|---|---|
| Unit | 024 | 030 | | Unit | 036 | 042 | 048 | 060 |
| Total Weight | 343 | 366 | | Total Weight | 433 | 460 | 480 | 492 |
| Corner Weight 1 | 69 | 74 | | Corner Weight 1 | 87 | 93 | 97 | 99 |
| Corner Weight 2 | 53 | 57 | | Corner Weight 2 | 68 | 72 | 74 | 76 |
| Corner Weight 3 | 83 | 88 | | Corner Weight 3 | 104 | 111 | 116 | 119 |
| Corner Weight 4 | 138 | 147 | | Corner Weight 4 | 174 | 184 | 193 | 198 |
| Rigging Weight | 353 | 376 | | Rigging Weight | 443 | 470 | 490 | 502 |

**Fig. 5 - 50SD Unit Corner Weights (in Pounds) and Suggested Rigging**




| MAXIMUM ALLOWABLE DIFFERENCE (in.) | | |
|---|---|---|
| A-B | B-C | A-C |
| 1/4 | 1/4 | 1/4 |

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**Fig. 6 - Unit Leveling Tolerances**

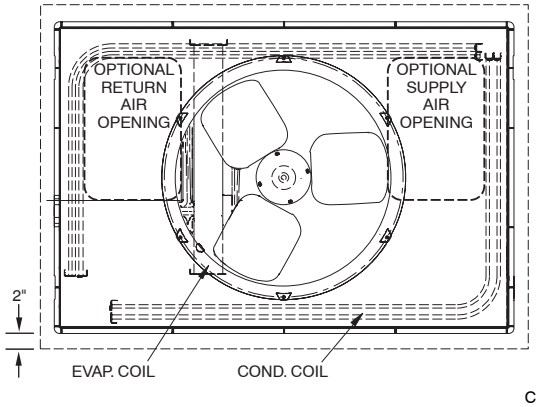


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**Fig. 7 - Slab Mounting Detail**

## ⚠ WARNING

**UNIT FALLING HAZARD**

Failure to follow this warning could result in personal injury or death.

Never stand beneath rigged units or lift over people.

INSTALLATION

The lifting/rigging bracket is engineered and designed to be installed *only* on Small Packaged Products. This bracket is to be used to rig/lift a Small Packaged Product onto roofs or other elevated structures.

## ⚠ WARNING

**PROPERTY DAMAGE HAZARD**

Failure to follow this warning could result in personal injury/death or property damage.

**Rigging brackets for one unit use only.** When removing a unit at the end of its useful life, use a new set of brackets.

USE OF RIGGING BRACKET

Field Installation of Rigging Bracket

1. If applicable, remove unit from shipping carton. Leave top shipping skid on the unit for use as a spreader bar to prevent the rigging straps from damaging the unit. If the skid is not available, use a spreader bar of sufficient length to protect the unit from damage.
2. Remove 4 screws in unit corner posts.

3. Attach each of the 4 metal rigging brackets under the panel rain lip (See Fig. 5). Use the screws removed in step 2 above to secure the brackets to the unit.

**⚠ WARNING**

**PROPERTY DAMAGE HAZARD**

Failure to follow this warning could result in personal injury/death or property damage.

Rigging bracket MUST be under the rain lip to provide adequate lifting.

**⚠ WARNING**

**PROPERTY DAMAGE HAZARD**

Failure to follow this warning could result in personal injury/death or property damage.

Do not strip screws when re-securing the unit. If a screw is stripped, replace the stripped one with a larger diameter screw (included).

Rigging/Lifting of Unit

1. Bend top of brackets down approximately 30 degrees from the corner posts.
2. Attach straps of equal length to the rigging brackets at opposite ends of the unit. Be sure straps are rated to hold the weight of the unit (See Fig. 5).
3. Attach a clevis of sufficient strength in the middle of the straps. Adjust the clevis location to ensure unit is lifted level with the ground.
4. After unit is securely in place detach rigging straps. Remove corner posts, screws, and rigging brackets then reinstall screws.

**⚠ WARNING**

**UNIT FALLING HAZARD**

Failure to follow this warning could result in personal injury/death or property damage.

When straps are taut, the clevis should be a minimum of 36 inches above the unit top cover.

After the unit is placed on the roof curb or mounting pad, remove the top crating.

**Step 6—Connect Condensate Drain**

**NOTE**: When installing condensate drain connection be sure to comply with local codes and restrictions.

Model 50SD disposes of condensate water through a 3/4 in. NPT fitting which exits through the base on the evaporator coil access side. See Fig. 2 & 3 for location.

Condensate water can be drained directly onto the roof in rooftop installations (where permitted) or onto a gravel apron in ground level installations. Install a field-supplied condensate trap at end of condensate connection to ensure proper drainage. Make sure that the outlet of the trap is at least 1 in. lower than the drain pan condensate connection to prevent the pan from overflowing (See Fig. 8). When using a gravel apron, make sure it slopes away from the unit.

Connect a drain tube using a minimum of 3/4 -in. PVC or 3/4 -in. copper pipe (all field-supplied) at the outlet end of the 2-in. trap. Do not undersize the tube. Pitch the drain tube downward at a slope of at least 1-in. for every 10 ft of horizontal run. Be sure to check the drain tube for leaks. Prime trap at the beginning of the cooling season start-up.

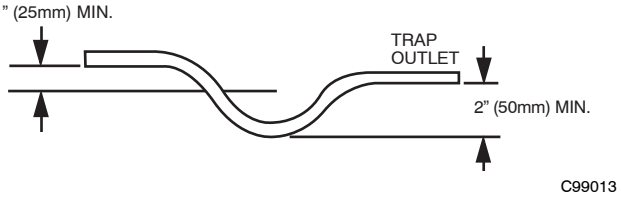


**Fig. 8 - Condensate Trap**

**Step 7—Install Duct Connections**

The design and installation of the duct system must be in accordance with the standards of the NFPA for installation of non-residence type air conditioning and ventilating systems, NFPA 90A or residence type, NFPA 90B and/or local codes and ordinances.

Select and size ductwork, supply-air registers, and return air grilles according to ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) recommendations. The unit has duct flanges on the supply- and return-air openings on the side of the unit.

When designing and installing ductwork, consider the following:

1. All units should have field-supplied filters or accessory filter rack installed in the return-air side of the unit. Recommended sizes for filters are shown in Table 1.
2. Avoid abrupt duct size increases and reductions. Abrupt change in duct size adversely affects air performance.

**IMPORTANT**: Use flexible connectors between ductwork and unit to prevent transmission of vibration. Use suitable gaskets to ensure weather-tight and airtight seal. When electric heat is installed, use fireproof canvas (or similar heat resistant material) connector between ductwork and unit discharge connection. If flexible duct is used, insert a sheet metal sleeve inside duct. Heat resistant duct connector (or sheet metal sleeve) must extend 24-in. from electric heater element.

3. Size ductwork for cooling air quantity (cfm). The minimum air quantity for proper electric heater operation is listed in Table 2. Heater limit switches may trip at air quantities below those recommended.
4. Seal, insulate, and weatherproof all external ductwork. Seal, insulate and cover with a vapor barrier all ductwork passing through conditioned spaces. Follow latest Sheet Metal and Air Conditioning Contractors National Association (SMACNA) and Air Conditioning Contractors Association (ACCA) minimum installation standards for residential heating and air conditioning systems.
5. Secure all ducts to building structure. Flash, weatherproof, and vibration-isolate duct openings in wall or roof according to good construction practices.

CONFIGURING UNITS FOR DOWNFLOW (VERTICAL) DISCHARGE

**⚠ WARNING**

**ELECTRICAL SHOCK HAZARD**

Failure to follow this warning could result in personal injury or death.

Before performing service or maintenance operations on the system, turn off main power to unit and install lockout tag.

1. Open all electrical disconnects and install lockout tag before starting any service work.

2. Remove return duct cover located on duct panel by breaking four (4) connecting tabs with screwdriver and a hammer (See Fig. 9 & 10).
3. To remove supply duct cover, break front and right side connecting tabs with a screwdriver and a hammer. Push louver down to break rear and left side tabs (See Fig. 9 & 10).
4. If unit ductwork is to be attached to vertical opening flanges on the unit composite base (jackstand applications only), do so at this time. Collect ALL screws that were removed. Do not leave screws on rooftop as permanent damage to the roof may occur.
5. It is recommended that the unit base insulation around the perimeter of the vertical return-air opening be secured to the unit base with aluminum tape. Applicable local codes may require aluminum tape to prevent exposed fiberglass.
6. Cover both horizontal duct openings with the duct covers from the accessory duct cover kit. Ensure opening is air-and watertight.
7. After completing unit conversion, perform all safety checks and power up unit.

**NOTE**:The design and installation of the duct system must be in accordance with the standards of the NFPA for installation of nonresidence-type air conditioning and ventilating systems, NFPA 90A or residence-type, NFPA 90B; and/or local codes and ordinances.

Adhere to the following criteria when selecting, sizing, and installing the duct system:

1. Units are shipped for side shot installation.
2. Select and size ductwork, supply-air registers, and return-air grilles according to American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) recommendations.
3. Use flexible transition between rigid ductwork and unit to prevent transmission of vibration. The transition may be screwed or bolted to duct flanges. Use suitable gaskets to ensure weather-tight and airtight seal.
4. All units must have field-supplied filters or accessory filter rack installed in the return-air side of the unit. Recommended sizes for filters are shown in Table 1.
5. Size all ductwork for maximum required airflow (either heating or cooling) for unit being installed. Avoid abrupt duct size increases or decreases or performance may be affected.
6. Adequately insulate and weatherproof all ductwork located outdoors. Insulate ducts passing through unconditioned space, and use vapor barrier in accordance with latest issue of Sheet Metal and Air Conditioning Contractors National Association (SMACNA) and Air Conditioning Contractors of America (ACCA) minimum installation standards for heating and air conditioning systems. Secure all ducts to building structure.
7. Flash, weatherproof, and vibration-isolate all openings in building structure in accordance with local codes and good building practices.

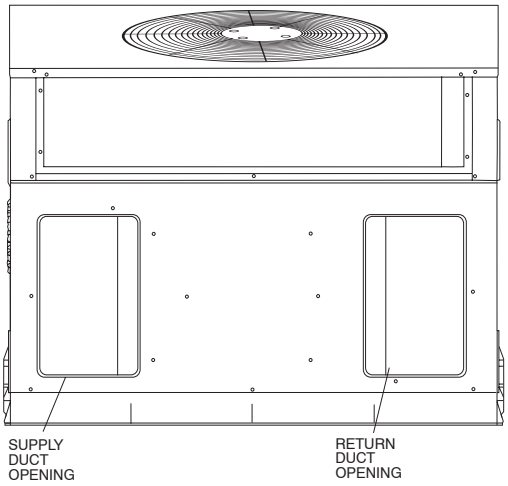


**Fig. 9 - Supply and Return Duct Opening**

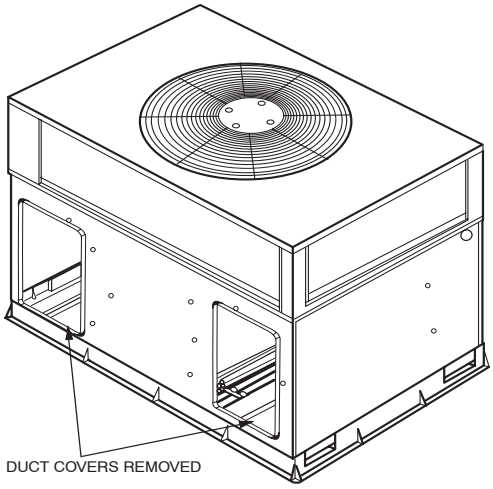


**Fig. 10 - Vertical Duct Cover Removed**

**Step 8—Install Electrical Connections**

## ⚠ WARNING

**ELECTRICAL SHOCK HAZARD**

Failure to follow this warning could result in personal injury or death.

The unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of an electrical wire connected to the unit ground screw in the control compartment, or conduit approved for electrical ground when installed in accordance with NEC, ANSI/NFPA American National Standards Institute/National Fire Protection Association (latest edition) (in Canada, Canadian Electrical Code CSA C22.1) and local electrical codes.

## ⚠ CAUTION

**UNIT COMPONENT DAMAGE HAZARD**

Failure to follow this caution may result in damage to the unit being installed.

1. Make all electrical connections in accordance with NEC ANSI/NFPA (latest edition) and local electrical codes governing such wiring. In Canada, all electrical connections must be in accordance with CSA standard C22.1 Canadian Electrical Code Part 1 and applicable local codes. Refer to unit wiring diagram.
2. Use only copper conductor for connections between field-supplied electrical disconnect switch and unit. DO NOT USE ALUMINUM WIRE.
3. Be sure that high-voltage power to unit is within operating voltage range indicated on unit rating plate. On 3-phase units, ensure phases are balanced within 2 percent. Consult local power company for correction of improper voltage and/or phase imbalance.
4. Do not damage internal components when drilling through any panel to mount electrical hardware, conduit, etc.

HIGH-VOLTAGE CONNECTIONS

The unit must have a separate electrical service with a field-supplied, waterproof disconnect switch mounted at, or within sight from the unit. Refer to the unit rating plate, NEC and local codes for maximum fuse/circuit breaker size and minimum circuit amps (ampacity) for wire sizing.

The field-supplied disconnect may be mounted on the unit over the high-voltage inlet hole when the standard power and low-voltage entry points are used. See Fig. 2 and 3 for acceptable location.

See unit wiring label and Fig. 11 for reference when making high voltage connections. Proceed as follows to complete the high-voltage connections to the unit.

Single phase units:

1. Run the high-voltage (L1, L2) and ground lead into the control box.
2. Connect ground lead to chassis ground connection.
3. Locate the black and yellow wires connected to the line side of the contactor.
4. Connect field L1 to black wire on connection 11 of the compressor contactor.
5. Connect field wire L2 to yellow wire on connection 23 of the compressor contactor.

Three-phase units:

1. Run the high-voltage (L1, L2, L3) and ground lead into the control box.
2. Connect ground lead to chassis ground connection.
3. Locate the black and yellow wires connected to the line side of the contactor.
4. Connect field L1 to black wire on connection 11 of the compressor contactor.
5. Connect field wire L2 to yellow wire on connection 13 of the compressor contactor.
6. Connect field wire L3 to blue wire from compressor.

SPECIAL PROCEDURES FOR 208-V OPERATION

## ⚠ WARNING

**ELECTRICAL SHOCK HAZARD**

Failure to follow this warning could result in personal injury or death.

Make sure that the power supply to the unit is switched OFF and lockout tag installed before making any wiring changes.

CONTROL VOLTAGE CONNECTIONS

**NOTE**:Do not use any type of power-stealing thermostat. Unit control problems may result.

Use no. 18 American Wire Gage (AWG) color-coded, insulated (35° C minimum) wires to make the control voltage connections between the thermostat and the unit. If the thermostat is located more than 100 ft from the unit (as measured along the control voltage wires), use no. 16 AWG color-coded, insulated (35° C minimum) wires.

STANDARD CONNECTION

Remove knockout hole located in the electric heat panel adjacent to the control access panel. See Fig. 2 & 3. Remove the rubber grommet from the installer's packet (included with unit) and install grommet in the knockout opening. Provide a drip loop before running wire through panel.

Run the low-voltage leads from the thermostat, through the inlet hole, and into unit low-voltage splice box.

Locate five 18-gage wires leaving control box. These low-voltage connection leads can be identified by the colors red, green, yellow, brown (See Fig. 11). Ensure the leads are long enough to be routed into the low-voltage splice box (located below right side of control box). Stripped yellow wire is located in connection box. Route leads through hole in bottom of control box and make low-voltage connections (See Fig. 11). Secure all cut wires, so that they do not interfere with operation of unit.

TRANSFORMER PROTECTION

The transformer is of the energy-limiting type. It is set to withstand a 30-second overload or shorted secondary condition.

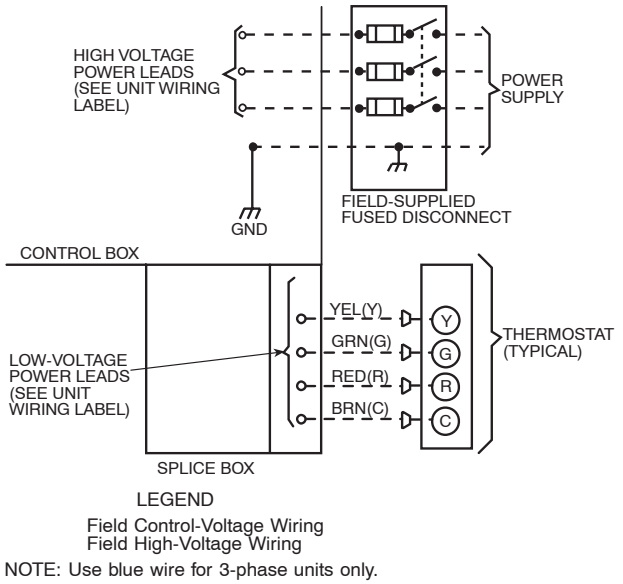


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**Fig. 11 - High- and Control-Voltage Connections**

**Table 1—Physical Data-Unit 50SD**

| UNIT SIZE | 024 | 030 | 036 | 042 | 048 | 060 |
|---|---|---|---|---|---|---|
| NOMINAL CAPACITY (ton) | 2 | 2-1/2 | 3 | 3-1/2 | 4 | 5 |
| OPERATING WEIGHT (lb.) | 289 | 312 | 371 | 398 | 418 | 430 |
| COMPRESSOR | Scroll | | | | | |
| REFRIGERANT (R-22) Quantity (lb.) | 7.8 | 8.2 | 10.7 | 10.8 | 12.1 | 11.8 |
| REFRIGERANT METERING DEVICE | AccuRater® | | | | | |
| ORIFICE OD (in.) | 0.065 | 0.070 | 0.080 | 0.088 | 0.088 | 0.101 |
| OUTDOOR COIL | | | | | | |
| Rows…Fins/in. | 2…21 | 2…21 | 2…21 | 2…21 | 2…21 | 2…21 |
| Face Area (sq. ft.) | 11.9 | 13.6 | 15.5 | 19.4 | 19.4 | 19.4 |
| OUTDOOR FAN | | | | | | |
| Nominal Cfm | 2700 | 2700 | 2800 | 2800 | 3300 | 3300 |
| Diameter | 22 | 22 | 22 | 22 | 22 | 22 |
| Motor HP (RPM) | 1/8 (825) | 1/8 (825) | 1/8 (825) | 1/8 (825) | 1/4 (1100) | 1/4 (1100) |
| INDOOR COIL | | | | | | |
| Rows…Fins/in. | 3…17 | 3…17 | 3…17 | 3…17 | 3…17 | 4…17 |
| Face Area (sq. ft.) | 3.7 | 3.7 | 4.7 | 4.7 | 5.6 | 5.6 |
| INDOOR BLOWER | | | | | | |
| Nominal Airflow (Cfm) | 800 | 1000 | 1200 | 1400 | 1600 | 1750 |
| Size (in.) | 10x10 | 10x10 | 11x10 | 11x10 | 11x10 | 11x10 |
| Motor HP (RPM) | 1/3 (1050) | 1/3 (1050) | 1/2 (1000) | 1/2 (1075) | 1/2 (1075) | 1.0 (1040) |
| RETURN-AIR FILTERS (IN.)* | | | | | | |
| Throwaway | 20x24x1 | 20x24x1 | 24x36x1 | 24x36x1 | 24x36x1 | 24x36x1 |

*Required filter sizes shown are based on the larger of the ARI (Air Conditioning and Refrigeration Institute) rated cooling airflow or the heating airflow velocity of 300 ft/minute for throwaway type. For permanent filters, follow filter manufacturer's recommendations for filter size based on allowable face velocity. Air filter pressure drop for non–standard filters must not exceed 0.08 in. wc.

**Table 2—Minimum Airflow for Safe Electric Heater Operation (Cfm)**

| SIZE | 024 | 030 | 036 | 042 | 048 | 060 |
|---|---|---|---|---|---|---|
| Cfm | 800 | 1000 | 1200 | 1400 | 1600 | 1750 |

## PRE-START-UP

**⚠ WARNING**

**FIRE, EXPLOSION, ELECTRICAL SHOCK HAZARD**

Failure to follow this warning could result in personal injury or death and/or property damage.

1. Follow recognized safety practices and wear protective goggles when checking or servicing refrigerant system.
2. Relieve and recover all refrigerant from system before touching or disturbing anything inside terminal box if refrigerant leak is suspected around compressor terminals.
3. Never attempt to repair soldered connection while refrigerant system is under pressure.
4. Do not use torch to remove any component. System contains oil and refrigerant under pressure.
5. To remove a component, wear protective goggles and proceed as follows:
   a. Shut off electrical power to unit and install lockout tag.
   b. Relieve and reclaim all refrigerant from system using both high- and low-pressure ports.
   c. Cut component connecting tubing with tubing cutter and remove component from unit.
   d. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Proceed as follows to inspect and prepare the unit for initial start-up:

1. Remove all access panels.
2. Read and follow instructions on all DANGER, WARNING, CAUTION, and INFORMATION labels attached to, or shipped with unit.
3. Make the following inspections:
   a. Inspect for shipping and handling damages, such as broken lines, loose parts, disconnected wires, etc.
   b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak test all refrigerant tubing connections using electronic leak detector, or liquid-soap solution. If a refrigerant leak is detected, see following Check for Refrigerant Leaks section.
   c. Inspect all field- and factory-wiring connections. Be sure that connections are completed and tight.
   d. Ensure wires do not touch refrigerant tubing or sharp sheet metal edges.
   e. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following conditions:
   a. Make sure that outdoor fan blade is correctly positioned in fan orifice (See Fig. 12).
   b. Make sure that condensate drain pan and trap are filled with water to ensure proper drainage.
   c. Make sure that all tools and miscellaneous loose parts have been removed.

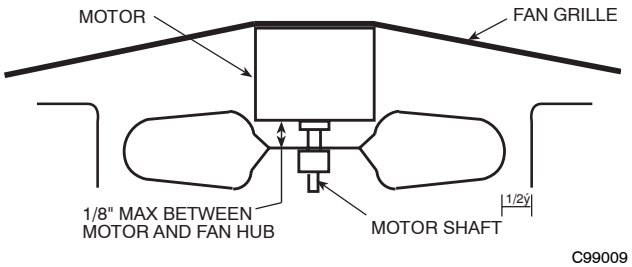


**Fig. 12 - Fan Blade Clearance**

## START-UP

CHECK FOR REFRIGERANT LEAKS

Proceed as follows to locate and repair a refrigerant leak and to charge the unit:

1. Locate leak and make sure that refrigerant system pressure has been relieved and reclaimed from both high- and low-pressure ports.
2. Repair leak following accepted practices.

**NOTE**: Install a filter drier whenever the system has been opened for repair.

3. Add a small charge of R-22 refrigerant vapor to system and leak-test unit.
4. Recover refrigerant from system and evacuate to 500 microns if no additional leaks are found.
5. Charge unit with R-22 refrigerant, using a volumetric charging cylinder or accurate scale. Refer to unit rating plate for required charge. Be sure to add extra refrigerant to compensate for internal volume of filter drier.

START-UP COOLING SECTION AND MAKE ADJUSTMENTS

Complete the required procedures given in the Pre-Start-Up section before starting the unit. Do not jumper any safety devices when operating the unit. Do not operate the unit when the outdoor temperature is below 40°F (unless accessory low-ambient kit is installed). Do not rapid cycle the compressor. Allow 5 minutes between "on" cycles to prevent compressor damage.

CHECKING COOLING CONTROL OPERATION

Start and check the unit for proper cooling control operation as follows:

1. Place room thermostat SYSTEM switch in OFF position. Observe that blower motor starts when FAN switch is placed in ON position and shuts down after 30 second fan time delay expires when FAN switch is placed in AUTO position.
2. Place SYSTEM switch in COOL position and FAN switch in AUTO position. Set cooling control below room temperature. Observe that compressor, condenser fan, and evaporator blower motors start. Observe that compressor and outdoor fan shut down when control setting is satisfied and that indoor blower shuts down after 30 second fan time delay expires.

**IMPORTANT**: Three-phase, scroll compressors are direction oriented. Unit must be checked to ensure proper compressor 3-phase power lead orientation. If not corrected within 5 minutes, the internal protector will shut off the compressor. The 3-phase power leads to the unit must be reversed to correct rotation. When turning backwards, the difference between compressor suction and discharge pressures may be dramatically lower than normal.

CHECKING AND ADJUSTING REFRIGERANT CHARGE

The refrigerant system is fully charged with R-22 refrigerant and is tested and factory sealed.

**NOTE**: Adjustment of the refrigerant charge is not required unless the unit is suspected of not having the proper R-22 charge.

A superheat charging chart is attached to the outside of the service access panel. The chart includes the required suction line temperature at given suction line pressures and outdoor ambient temperatures.

An accurate superheat, thermocouple- or thermistor-type thermometer, and a gauge manifold are required when using the superheat charging method for evaluating the unit charge. Do not use mercury or small dial-type thermometers because they are not adequate for this type of measurement.

**NOTE**: Allow system to operate for a minimum of 10 minutes before checking or adjusting refrigerant charge.

**IMPORTANT**: When evaluating the refrigerant charge, an indicated adjustment to the specified factory charge must always be very minimal. If a substantial adjustment is indicated, an abnormal condition exists somewhere in the cooling system, such as insufficient airflow across either coil or both coils.

Proceed as follows:

1. Remove caps from low- and high-pressure service fittings.
2. Using hoses with valve core depressors, attach low- and high-pressure gauge hoses to low- and high-pressure service fittings, respectively.
3. Start unit and let run until system pressures stabilize.
4. Measure and record the following:
   a. Outdoor ambient-air temperature (°F db).
   b. Suction-tube temperature (°F) at low-side service fitting.
   c. Suction (low-side) pressure (psig).
5. Using Cooling Charging Charts compare outdoor-air temperature (°F db) with the suction line pressure (psig) to determine desired system operating suction line temperature (See Fig. 16).
6. Compare actual suction-tube temperature with desired suction-tube temperature. Using a tolerance of ±3°F, add refrigerant if actual temperature is more than 3°F higher than proper suction-tube temperature, or remove refrigerant if actual temperature is more than 3°F lower than required suction-tube temperature.

**NOTE**: If the problem causing the inaccurate readings is a refrigerant leak, refer to Check for Refrigerant Leaks section.

INDOOR AIRFLOW AND AIRFLOW ADJUSTMENTS

**NOTE**: For cooling operation, the recommended airflow is 350 to 450 cfm for each 12,000 Btuh of rated cooling capacity.

Table 3 shows cooling airflows at various external static pressures. Refer to this table to determine the airflow for the system being installed.

**NOTE**: Be sure that all supply- and return-air grilles are open, free from obstructions, and adjusted properly.

**⚠ WARNING**

**ELECTRICAL SHOCK HAZARD**

Failure to follow this warning could result in personal injury or death.

Disconnect electrical power to the unit and install lockout tag before changing blower speed.

**Table 3—Wet Coil Air Delivery* — Horizontal Discharge**
**(Deduct 10% for 208-Volt Operation)**

| 230 VOLT HORIZONTAL DISCHARGE | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UNIT SIZE | MOTOR SPEED | AIR DELIVERY | EXTERNAL STATIC PRESSURE (IN. WC) | | | | | | | | | |
| | | | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| 024 | Low | Watts | 311 | 309 | 304 | 301 | 286 | — | — | — | — | — |
| | | CFM | 935 | 885 | 820 | 757 | 686 | — | — | — | — | — |
| | Med | Watts | — | — | — | — | 379 | 357 | 357 | 345 | 327 | — |
| | | CFM | — | — | — | — | 957 | 868 | 769 | 647 | 365 | — |
| | High | Watts | — | — | — | — | — | — | 447 | 435 | 421 | — |
| | | CFM | — | — | — | — | — | — | 970 | 853 | 712 | — |
| 030 | Low | Watts | 311 | 309 | 304 | 301 | — | — | — | — | — | — |
| | | CFM | 935 | 885 | 820 | 757 | — | — | — | — | — | — |
| | Med | Watts | 411 | 405 | 398 | 390 | 379 | 357 | 357 | — | — | — |
| | | CFM | 1195 | 1155 | 1100 | 1028 | 957 | 868 | 769 | — | — | — |
| | High | Watts | — | — | — | — | 477 | 467 | 447 | 435 | — | — |
| | | CFM | — | — | — | — | 1185 | 1088 | 970 | 853 | — | — |
| 036 | Low | Watts | 437 | 433 | 424 | 417 | 403 | 391 | 379 | 362 | — | — |
| | | CFM | 1353 | 1318 | 1283 | 1235 | 1187 | 1123 | 1059 | 975 | — | — |
| | Med | Watts | — | — | — | 531 | 516 | 496 | 478 | 459 | 435 | — |
| | | CFM | — | — | — | 1489 | 1437 | 1362 | 1289 | 1208 | 1099 | — |
| | High | Watts | — | — | — | — | — | — | — | 629 | 602 | — |
| | | CFM | — | — | — | — | — | — | — | 1470 | 1357 | — |
| 042 | Low | Watts | 625 | 606 | 586 | 571 | 550 | 534 | 509 | 483 | 457 | — |
| | | CFM | 1539 | 1496 | 1466 | 1437 | 1387 | 1330 | 1264 | 1183 | 1093 | — |
| | Med | Watts | — | 741 | 715 | 694 | 669 | 645 | 610 | 573 | 544 | — |
| | | CFM | — | 1738 | 1698 | 1653 | 1604 | 1538 | 1457 | 1362 | 1271 | — |
| | High | Watts | — | — | — | — | — | 798 | 772 | 738 | 700 | — |
| | | CFM | — | — | — | — | — | 1720 | 1648 | 1540 | 1414 | — |
| 048 | Low | Watts | 627 | 617 | 607 | 584 | 567 | 548 | 528 | 503 | — | — |
| | | CFM | 1550 | 1530 | 1493 | 1461 | 1414 | 1361 | 1320 | 1250 | — | — |
| | Med | Watts | 771 | 755 | 734 | 711 | 690 | 665 | 639 | 607 | 572 | — |
| | | CFM | 1798 | 1771 | 1734 | 1687 | 1645 | 1595 | 1530 | 1449 | 1355 | — |
| | High | Watts | — | — | 908 | 887 | 858 | 827 | 804 | 767 | 748 | — |
| | | CFM | — | — | 2000 | 1994 | 1876 | 1811 | 1735 | 1647 | 1555 | — |
| 060 | Low | Watts | 786 | 769 | 754 | 736 | 722 | 705 | 684 | 658 | — | — |
| | | CFM | 2027 | 1960 | 1901 | 1821 | 1759 | 1693 | 1616 | 1513 | — | — |
| | Med | Watts | 873 | 849 | 833 | 815 | 798 | 782 | 763 | 748 | — | — |
| | | CFM | 2095 | 2026 | 1962 | 1887 | 1817 | 1748 | 1679 | 1583 | — | — |
| | High | Watts | 1012 | 993 | 981 | 963 | 948 | 927 | 904 | 886 | — | — |
| | | CFM | 2184 | 2109 | 2036 | 1963 | 1886 | 1812 | 1729 | 1647 | — | — |

*Air delivery values are based on operating voltage of 230v, wet coil, without filter or electric heater. Deduct filter and electric heater pressure drops to obtain static pressure available for ducting.

NOTES:

1. Do not operate the unit at a cooling airflow that is less than 350 cfm for each 12,000 Btuh of rated cooling capacity. Evaporator coil frosting may occur at airflows below this point.
2. Dashes indicate portions of table that are beyond the blower motor capacity or are not recommended.

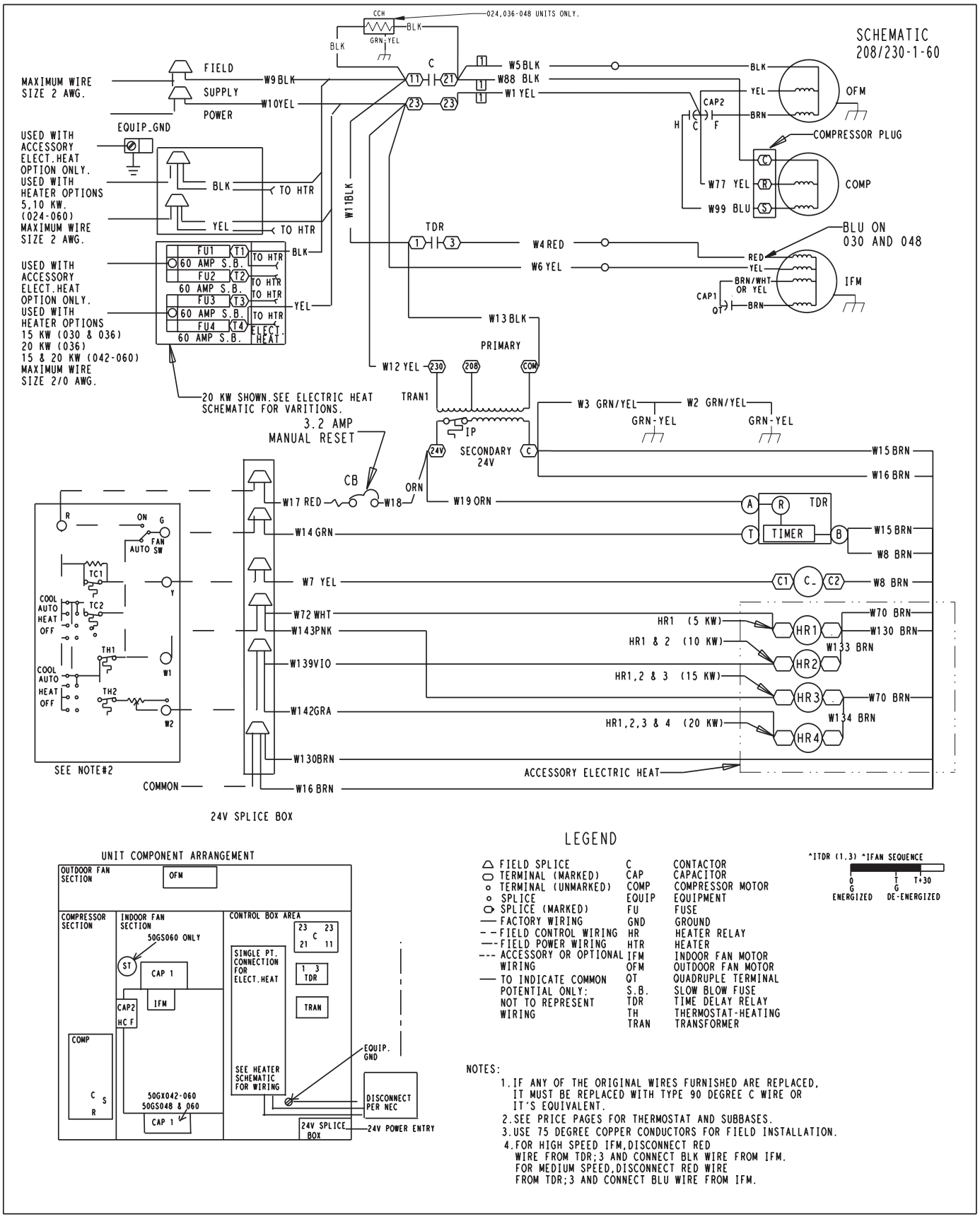


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**Fig. 13 - Wiring Diagram 208/230-1-60**

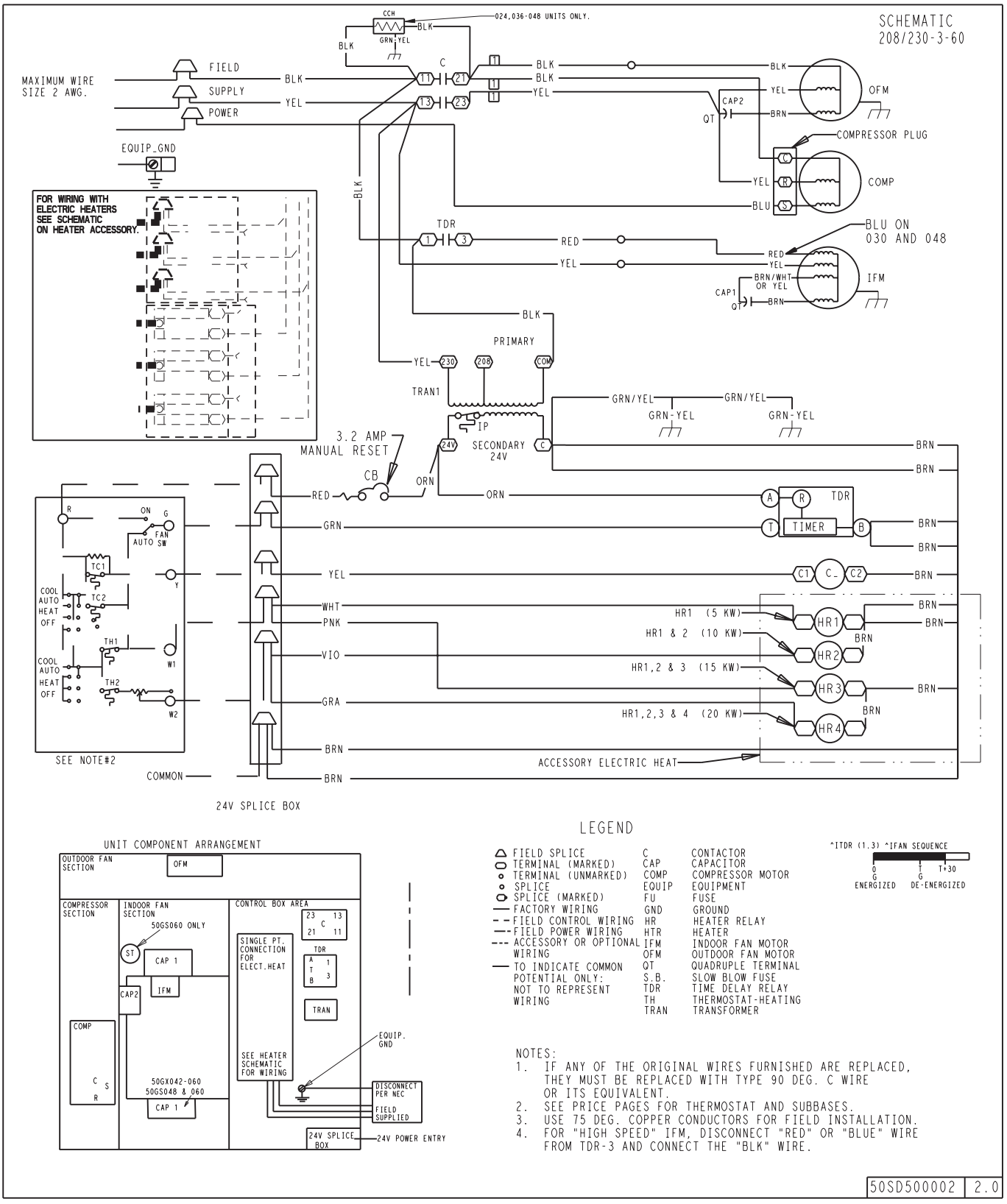


**Fig. 14 - Wiring Diagram 208/230-3-60**

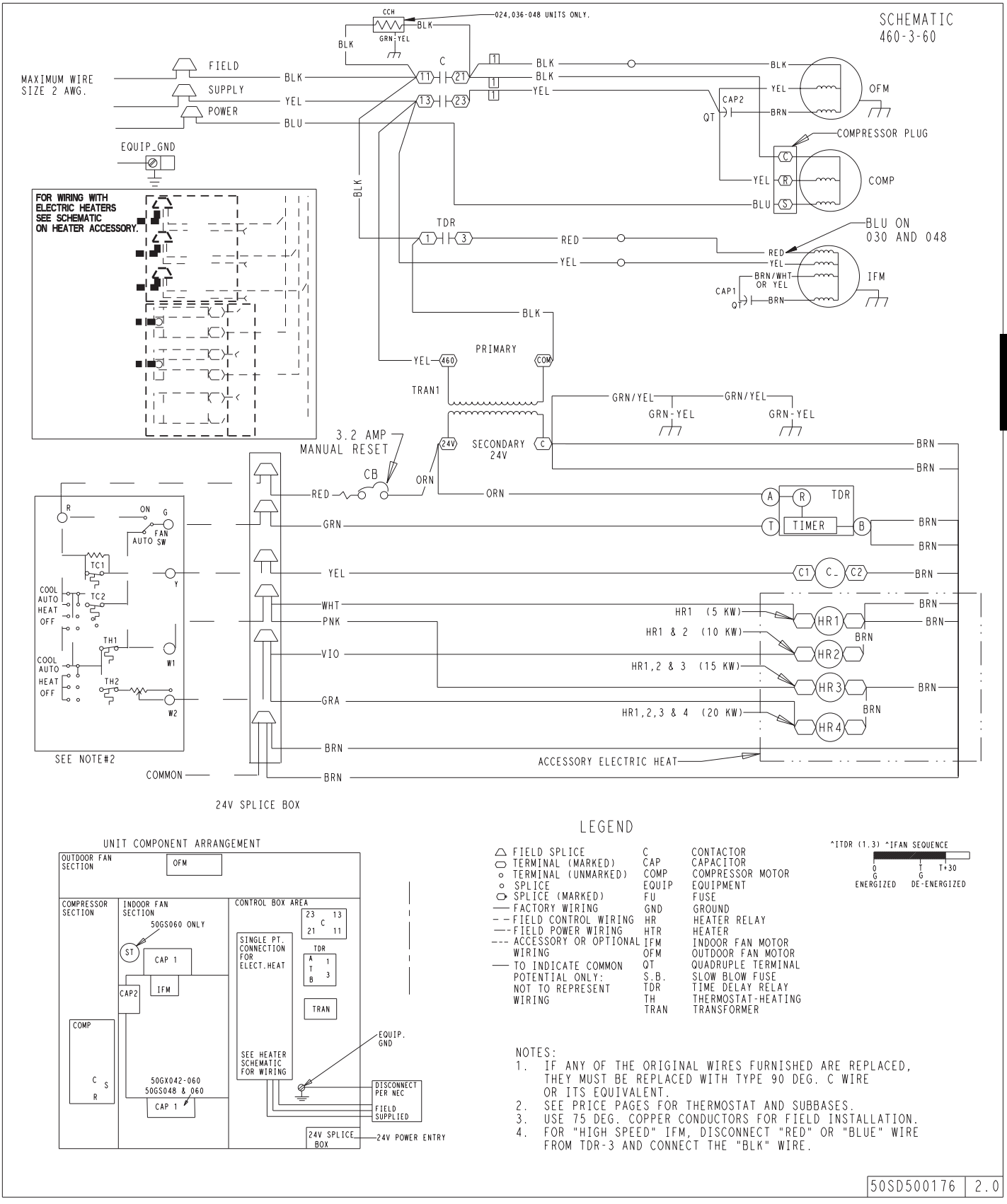


**Fig. 15 - Wiring Diagram 460-3-60**

| Suction Line Temperature (°F) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OD Temp. (°F) | Suction Line Pressure (PSIG) | | | | | | | | | | | | | | |
| | 52 | 54 | 56 | 59 | 61 | 64 | 67 | 70 | 73 | 76 | 79 | 82 | 85 | 89 | 92 |
| 45 | 51 | 55 | 60 | 64 | 69 | - | - | - | - | - | - | - | - | - | - |
| 55 | - | - | 53 | 57 | 62 | 66 | 70 | - | - | - | - | - | - | - | - |
| 65 | - | - | - | - | 53 | 57 | 62 | 66 | 71 | 75 | - | - | - | - | - |
| 75 | - | - | - | - | - | - | - | 56 | 61 | 66 | 71 | 76 | - | - | - |
| 85 | - | - | - | - | - | - | - | - | 53 | 58 | 63 | 67 | 72 | - | - |
| 95 | - | - | - | - | - | - | - | - | - | 50 | 54 | 58 | 62 | 66 | - |
| 105 | - | - | - | - | - | - | - | - | - | - | 50 | 53 | 57 | 60 | 64 |
| 115 | - | - | - | - | - | - | - | - | - | - | 49 | 52 | 55 | 58 | 61 |
| 125 | - | - | - | - | - | - | - | - | - | - | - | 50 | 53 | 56 | 59 |

| Suction Line Temperature (°C) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OD Temp. (°C) | Suction Line Pressure (kPa) | | | | | | | | | | | | | | |
| | 361 | 370 | 387 | 405 | 423 | 442 | 462 | 482 | 502 | 523 | 544 | 566 | 589 | 612 | 636 |
| 7 | 11 | 13 | 15 | 18 | 21 | - | - | - | - | - | - | - | - | - | - |
| 13 | - | - | 12 | 14 | 16 | 19 | 21 | - | - | - | - | - | - | - | - |
| 18 | - | - | - | - | 12 | 14 | 17 | 19 | 21 | 24 | - | - | - | - | - |
| 24 | - | - | - | - | - | - | - | 13 | 16 | 19 | 22 | 24 | - | - | - |
| 29 | - | - | - | - | - | - | - | - | 12 | 14 | 17 | 20 | 22 | - | - |
| 35 | - | - | - | - | - | - | - | - | - | 10 | 12 | 14 | 17 | 19 | - |
| 41 | - | - | - | - | - | - | - | - | - | - | 10 | 12 | 14 | 16 | 18 |
| 46 | - | - | - | - | - | - | - | - | - | - | 9 | 11 | 13 | 14 | 16 |
| 52 | - | - | - | - | - | - | - | - | - | - | - | 10 | 11 | 13 | 15 |

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**Fig. 16 - Cooling Charging Chart**

Airflow can be changed by changing the lead connections of the blower motor.

All 50SD units are factory wired for low speed, except sizes 030 and 048 which are wired for medium speed.

FOR 208/230v

For color coding on the 208/230v motor leads, see Table 4.

**Table 4—Color Coding for 208/230v Motor Leads**

| |
|---|
| Black = High Speed |
| Blue = Medium Speed |
| Red = Low Speed |

To change the speed of the indoor fan motor (IFM), remove the fan motor speed leg lead from the time delay relay (TDR). This wire is attached to terminal-3 of TDR for 3-phase units. To change the speed, remove and replace with lead for desired blower motor speed. Insulate the removed lead to avoid contact with chassis parts.

COOLING SEQUENCE OF OPERATION

With the room thermostat SYSTEM switch in the COOL position and the FAN switch in the AUTO position, the cooling sequence of operation is as follows:

When the room temperature rises to a point that is slightly above the cooling control setting of the thermostat, the thermostat completes the circuit between thermostat terminal R to terminals Y and G. These completed circuits through the thermostat connect contactor coil (C) (through unit wire Y) and time delay relay (TDR) (through unit wire G) across the 24-v secondary of transformer (TRAN).

The normally open contacts of energized contactor (C) close and complete the circuit through compressor motor (COMP) to condenser (outdoor) fan motor (OFM). Both motors start instantly.

The set of normally open contacts of energized relay TDR close and complete the circuit through evaporator blower (indoor) fan motor (IFM).

**NOTE**: Once the compressor has started and then has stopped, it should not be started again until 5 minutes have elapsed.

The cooling cycle remains on until the room temperature drops to a point that is slightly below the cooling control setting of the room thermostat. At this point, the thermostat breaks the circuit between thermostat terminal R to terminals Y and G. These open circuits deenergize contactor coil C and relay coil TDR. The condenser and compressor motors stop. After a 30-second delay, the blower motor stops. The unit is in a standby condition, waiting for the next call for cooling from the room thermostat.

## MAINTENANCE

To ensure continuing high performance, and to minimize the possibility of premature equipment failure, periodic maintenance must be performed on this equipment. This cooling unit should be inspected at least once each year by a qualified service person. To troubleshoot unit, refer to Table 5, Troubleshooting Chart.

NOTE TO EQUIPMENT OWNER: Consult your local dealer about the availability of a maintenance contract.

## ⚠ WARNING

**PERSONAL INJURY AND UNIT DAMAGE HAZARD**

Failure to follow this warning could result in personal injury or death and possible unit component damage.

The ability to properly perform maintenance on this equipment requires certain expertise, mechanical skills, tools and equipment. If you do not possess these, do not attempt to perform any maintenance on this equipment, other than those procedures recommended in the Owner's Manual.

## ⚠ WARNING

**ELECTRICAL SHOCK HAZARD**

Failure to follow these warnings could result in personal injury or death:

1. Turn off electrical power to the unit before performing any maintenance or service on this unit.
2. Use extreme caution when removing panels and parts.
3. Never place anything combustible either on or in contact with the unit.

## ⚠ CAUTION

**UNIT OPERATION HAZARD**

Failure to follow this caution may result in equipment damage or improper operation.

Errors made when reconnecting wires may cause improper and dangerous operation. Label all wires prior to disconnecting when servicing.

The minimum maintenance requirements for this equipment are as follows:

1. Inspect air filter(s) each month. Clean or replace when necessary.
2. Inspect indoor coil, drain pan, and condensate drain each cooling season for cleanliness. Clean when necessary.
3. Inspect blower motor and wheel for cleanliness each cooling season. Clean when necessary.
4. Check electrical connections for tightness and controls for proper operation each cooling season. Service when necessary.
5. Ensure electric wires are not in contact with refrigerant tubing or sharp metal edges.

AIR FILTER

**IMPORTANT**: Never operate the unit without a suitable air filter in the return-air duct system. Always replace the filter with the same dimensional size and type as originally installed. See Table 1 for recommended filter sizes.

Inspect air filter(s) at least once each month and replace (throwaway-type) or clean (cleanable-type) at least twice during each cooling season and twice during the heating season, or whenever the filter becomes clogged with dust and lint.

INDOOR BLOWER AND MOTOR

**NOTE**: All motors are pre-lubricated. Do not attempt to lubricate these motors.

For longer life, operating economy, and continuing efficiency, clean accumulated dirt and grease from the blower wheel and motor annually.

## ⚠ WARNING

**ELECTRICAL SHOCK HAZARD**

Failure to follow this warning could result in personal injury or death.

Disconnect and tag electrical power to the unit before cleaning and lubricating the blower motor and wheel.

To clean the blower motor and wheel:

1. Remove and disassemble blower assembly as follows:
   a. Remove unit access panel.
   b. Disconnect motor lead from time delay relay (TDR). Disconnect yellow lead from terminal L2 of the contactor.
   c. On all units remove blower assembly from unit. Remove screws securing blower to blower partition and slide assembly out. Be careful not to tear insulation in blower compartment.
   d. Ensure proper reassembly by marking blower wheel and motor in relation to blower housing before disassembly.
   e. Loosen setscrew(s) that secures wheel to motor shaft, remove screws that secure motor mount brackets to housing, and slide motor and motor mount out of housing.
2. Remove and clean blower wheel as follows:
   a. Ensure proper reassembly by marking wheel orientation.
   b. Lift wheel from housing. When handling and/or cleaning blower wheel, be sure not to disturb balance weights (clips) on blower wheel vanes.
   c. Remove caked-on dirt from wheel and housing with a brush. Remove lint and/or dirt accumulations from wheel and housing with vacuum cleaner, using soft brush attachment. Remove grease and oil with mild solvent.
   d. Reassemble wheel into housing.
   e. Reassemble motor into housing. Be sure setscrews are tightened on motor shaft flats and not on round part of shaft.
   f. Reinstall unit access panel.
3. Restore electrical power to unit. Start unit and check for proper blower rotation and motor speeds during cooling cycles.

OUTDOOR COIL, INDOOR COIL, AND CONDENSATE DRAIN PAN

Inspect the condenser coil, evaporator coil, and condensate drain pan at least once each year.

The coils are easily cleaned when dry; therefore, inspect and clean the coils either before or after each cooling season. Remove all obstructions, including weeds and shrubs, that interfere with the airflow through the condenser coil.

Straighten bent fins with a fin comb. If coated with dirt or lint, clean the coils with a vacuum cleaner, using the soft brush attachment. Be careful not to bend the fins. If coated with oil or grease, clean the coils with a mild detergent and water solution. Rinse coils with clear water, using a garden hose. Be careful not to splash water on motors, insulation, wiring, or air filter(s). For best results, spray condenser coil fins from inside to outside the unit. On units with an outer and inner condenser coil, be sure to clean between the coils. Be sure to flush all dirt and debris from the unit base.

Inspect the drain pan and condensate drain line when inspecting the coils. Clean the drain pan and condensate drain by removing all foreign matter from the pan. Flush the pan and drain trough with clear water. Do not splash water on the insulation, motor, wiring, or air filter(s). If the drain trough is restricted, clear it with a "plumbers snake" or similar probe device.

OUTDOOR FAN

**⚠ CAUTION**

**UNIT OPERATION HAZARD**

Failure to follow this caution may result in damage to unit components.

Keep the condenser fan free from all obstructions to ensure proper cooling operation. Never place articles on top of the unit.

1. Remove 6 screws holding outdoor grille and motor to top cover.
2. Turn motor/grille assembly upside down on top cover to expose fan blade.
3. Inspect the fan blades for cracks or bends.
4. If fan needs to be removed, loosen setscrew and slide fan off motor shaft.
5. When replacing fan blade, position blade so that the hub is 1/8 in. away from the motor end (1/8 in. of motor shaft will be visible) (See Fig. 12).
6. Ensure that set screw engages the flat area on the motor shaft when tightening.
7. Replace grille.

ELECTRICAL CONTROLS AND WIRING

Inspect and check the electrical controls and wiring annually. Be sure to turn off the electrical power to the unit.

Remove access panel to locate all the electrical controls and wiring. Check all electrical connections for tightness. Tighten all screw connections. If any smoky or burned connections are noticed, disassemble the connection, clean all the parts, re-strip the wire end and reassemble the connection properly and securely.

After inspecting the electrical controls and wiring, replace all the panels. Start the unit, and observe at least one complete cooling cycle to ensure proper operation. If discrepancies are observed in operating cycle, or if a suspected malfunction has occurred, check each electrical component with the proper electrical instrumentation. Refer to the unit wiring label when making these checks.

REFRIGERANT CIRCUIT

Inspect all refrigerant tubing connections and the unit base for oil accumulation annually. Detecting oil generally indicates a refrigerant leak.

**⚠ WARNING**

**EXPLOSION, PERSONAL INJURY HAZARD**

Failure to follow this warning could result in property damage, personal injury or death.

System under pressure. Relieve pressure and recover all refrigerant before system repair or final unit disposal. Use all service ports and open all flow-control devices, including solenoid valves.

If oil is detected or if low performance is suspected, leak test all refrigerant tubing using an electronic leak detector, or liquid-soap solution. If a refrigerant leak is detected, refer to Check for Refrigerant Leaks section.

If no refrigerant leaks are found and low performance is suspected, refer to Checking and Adjusting Refrigerant Charge section.

INDOOR AIRFLOW

The cooling airflow does not require checking unless improper performance is suspected. If a problem exists, be sure that all supply- and return-air grilles are open and free from obstructions, and that the air filter is clean.

METERING DEVICES-ACCURATER PISTON

This metering device is a fixed orifice and is contained in the brass body in the liquid line feeding the indoor coil.

## TROUBLESHOOTING

Refer to the Troubleshooting Chart (Table 5) for troubleshooting information.

## START-UP CHECKLIST

Use the Start-Up Checklist at the back of this manual.

**Table 5—Troubleshooting Chart**

| SYMPTOM | CAUSE | REMEDY |
|---|---|---|
| **Compressor and outdoor fan will not start** | Power failure | Call power company |
| | Fuse blown or circuit breaker tripped | Replace fuse or reset circuit breaker |
| | Defective contactor, transformer, control relay, or high-pressure, loss-of-charge or low-pressure switch | Replace component |
| | Insufficient line voltage | Determine cause and correct |
| | Incorrect or faulty wiring | Check wiring diagram and rewire correctly |
| | User Interface setting too low/too high | Reset UI setting |
| **Compressor will not start but condenser fan runs** | Faulty wiring or circuit<br>Loose connections in compressor | Check wiring and repair or replace |
| | Compressor motor burned out, seized, or internal overload open | Determine cause<br>Replace compressor |
| | Defective run capacitor, overload, or PTC (positive temperature coefficient) thermistor | Determine cause and replace |
| | One leg of 3-phase power dead | Replace fuse or reset circuit breaker<br>Determine cause |
| | Low input voltage (20 percent low) | Determine cause and correct |
| **Three-phase scroll compressor (size 030-060 unit) has a low pressure differential** | Scroll compressor is rotating in the wrong direction | Correct the direction of rotation by reversing the 3-phase power leads to the unit |
| **Compressor cycles (other than normally satisfying) cooling/heating calls** | Refrigerant overcharge or undercharge | Recover refrigerant, evacuate system, and recharge to capacities shown on rating plate |
| | Defective compressor | Replace and determine cause |
| | Insufficient line voltage | Determine cause and correct |
| | Blocked outdoor coil | Determine cause and correct |
| | Defective run/start capacitor, overload or start relay | Determine cause and replace |
| | Faulty outdoor fan motor or capacitor | Replace |
| | Restriction in refrigerant system | Locate restriction and remove |
| **Compressor operates continuously** | Dirty air filter | Replace filter |
| | Unit undersized for load | Decrease load or increase unit size |
| | UI temperature set too low | Reset UI setting |
| | Low refrigerant charge | Locate leak, repair, and recharge |
| | Air in system | Recover refrigerant, evacuate system, and recharge |
| | Outdoor coil dirty or restricted | Clean coil or remove restriction |
| **Excessive head pressure** | Dirty air filter | Replace filter |
| | Dirty indoor or outdoor coil | Clean coil |
| | Refrigerant overcharged | Recover excess refrigerant |
| | Air in system | Recover refrigerant, evacuate system, and recharge |
| | Indoor or outdoor air restricted or air short-cycling | Determine cause and correct |
| **Head pressure too low** | Low refrigerant charge | Check for leaks, repair and recharge |
| | Restriction in liquid tube | Remove restriction |
| **Excessive suction pressure** | High heat load | Check for source and eliminate |
| | Reversing valve hung up or leaking internally | Replace valve |
| | Refrigerant overcharged | Recover excess refrigerant |
| **Suction pressure too low** | Dirty air filter | Replace filter |
| | Low refrigerant charge | Check for leaks, repair and recharge |
| | Metering device or low side restricted | Remove source of restriction |
| | Insufficient coil airflow | Check filter–replace if necessary |
| | Temperature too low in conditioned area | Reset UI setting |
| | Outdoor ambient below 55°F | Install low-ambient kit |
| | Filter drier restricted | Replace |

## START-UP CHECKLIST
## (Remove and Store in Job File)

**I. Preliminary Information**

MODEL NO.:_____
SERIAL NO.:_____
DATE:_____
TECHNICIAN:_____

**II. PRE-START-UP (Insert checkmark in box as each item is completed)**

( ) VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
( ) REMOVE ALL SHIPPING HOLD DOWN BOLTS AND BRACKETS PER INSTALLATION INSTRUCTIONS
( ) CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS
( ) CHECK THAT INDOOR (EVAPORATOR) AIR FILTER IS CLEAN AND IN PLACE
( ) VERIFY THAT UNIT INSTALLATION IS LEVEL
( ) CHECK FAN WHEEL, AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS



**III. START-UP**

**ELECTRICAL**

SUPPLY VOLTAGE _____
COMPRESSOR AMPS_____
INDOOR (EVAPORATOR) FAN AMPS_____

**TEMPERATURES**

OUTDOOR (CONDENSER) AIR TEMPERATURE _____DB
RETURN-AIR TEMPERATURE _____DB _____WB
COOLING SUPPLY AIR _____DB _____WB

**PRESSURES**

REFRIGERANT SUCTION _____PSIG SUCTION LINE TEMP*_____
REFRIGERANT DISCHARGE _____PSIG DISCHARGE TEMP†_____
( ) VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS

*Measured at suction inlet to compressor
†Measured at liquid line leaving condenser.

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